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**CARTON AND CARTON BLANK WITH FRANGIBLE CONNECTIONS**Background of the Invention

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The present invention relates to a carton for containing a plurality of similar articles, such as bottles and a means for retaining the bottles within the carton and in particular to a means for accessing the articles.

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Cartons for encasing multiple articles are useful for enabling consumers to obtain and transport a desired quantity of individual articles such as soft drinks or other beverages. Such cartons need to be strong enough to support multiple articles, especially if the articles are bottles. It is also desirable for such cartons to be easy to handle and portable.

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It is often desirable for the articles contained within the carton to be displayed and also for the carton to have large areas which can be printed with advertising graphics. It is also often desirable for the articles to be easily accessible and it is also preferable for the articles to be secured in place within the carton, especially if the articles are fragile, for example glass bottles. It is however undesirable for articles to be accessed too easily, for example, before being purchased.

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It is also desirable to have a carton which after the contents of the articles have been consumed can be used to return the empty articles to a recycling point.

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The present invention seeks to provide a means for displaying the articles or a portion of the articles in combination with an access means for removal of the articles where the access means leaves the carton with sufficient integrity for replacement of articles for the purpose of returning to a recycling point.

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Summary of the Invention

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According to a first aspect of the invention in a carton of the type comprising an open top container and a separate top closure, the top closure having a plurality of apertures, each to receive a portion of an article held within the container, each aperture having a frangible connection to at least one other aperture to facilitate the removal of the articles, such that in use the removal of the articles breaks the frangible connection, the arrangement being such that the structural integrity of the carton is substantially maintained upon removal of the articles.

Preferably the plurality of apertures are arranged in rows, each aperture of a row having a frangible connection to at least one other aperture of the same and or different row. Preferably, each aperture at the end of a row may be connected to an edge of the top closure by a further frangible connection.

Additionally a frangible connection between two apertures may intersect a frangible connection between two other apertures.

Preferably, the arrangement is such that upon removal of the articles no material is removed from the top closure. The plurality of apertures may also be arranged in three rows, a central row being offset from the other rows and apertures of the central row having a frangible connection to at least two other apertures of each of the other two rows.

According to a second aspect of the invention, in a carton of the type comprising an open top container and a separate top closure, the top closure having a plurality of apertures, each to receive a portion of an article held within the container, each aperture having a frangible connection to at least one other aperture to facilitate the removal of the articles, such that in use the removal of the articles breaks the frangible connection, the arrangement being such that the structural integrity of the carton is substantially maintained upon removal of the articles, wherein the carton further comprises at least one reinforced handle structure, the arrangement being such that the or each reinforced handle structure is of multi-ply construction, wherein at least one ply is provided by the open top container and at least one further ply is provided by the top closure.

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Preferably the open top container comprises side walls, the ply provided by the open top container being struck from one of said side walls. A ply of the reinforced handle structure may be provided by a handle panel hinged to the top closure.

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Additionally the handle panel hinged to the top closure may be secured in flat face contact with an inner face of the ply struck from one of said side walls.

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Alternatively or additionally a further ply of the reinforced handle structure may be provided by the top closure and hinged to a handle panel.

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According to a third aspect of the invention, a carton of the type comprising an open top container and a separate top closure, wherein at least one of the walls of the open top container has a top flap folded to extend downwardly into the open top container, wherein the top closure comprises an engaging tab for engaging the top flap such that the engaging tab is disposed in face contacting relationship between the one wall and the top flap, the arrangement being such that the top closure is locked in a recessed position below the top of the open top container.

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According to yet a further aspect of the invention a two-part blank for forming a carton of the type comprising an open top container and a separate top closure, a first part of the blank is erected to form the open top container and a second part of the blank is erected to form a top closure having a plurality of apertures, each to receive a portion of an article held within the container, each aperture having a frangible connection to at least one other aperture to facilitate the removal of the articles, such that in use the removal of the articles breaks the frangible connection, the arrangement being such that the structural integrity of the set up carton is substantially maintained upon removal of the articles.

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According to yet a further aspect of the invention a two-part blank for forming a carton of the type comprising an open top container and a separate top closure wherein a first blank is erected to form the open top container and a second blank is erected to form the top closure, the top closure having a plurality of apertures, each to receive a portion of an

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article held within the container, each aperture having a frangible connection to at least one other aperture to facilitate the removal of the articles, the removal of the articles breaks the frangible connection, the arrangement being such that the structural integrity of the carton is substantially maintained upon removal of the articles, wherein the set up  
5 carton further comprises at least one reinforced handle structure, the arrangement such that the reinforced handle structure is of multi-ply construction, wherein at least one ply is provided by the open top container and at least one further ply is provided by the top closure.

10 Preferably, the first blank comprises side walls wherein at least one ply of the reinforced handle structure is struck from one of said side walls. The second blank may comprise at least one handle panel for forming, in a setup carton, the ply provided by the top closure.

#### Brief Description of the Drawings

15 Exemplary embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which;

20 Figure 1A illustrates a first part of a blank for forming a carton according to a first embodiment of the invention;

Figure 1B illustrates a second part of a blank for forming a carton according to a first embodiment of the invention;

25 Figure 1C is a perspective view from the front, side and top of a carton constructed from the blanks of Figs. 1A and 1B;

Figure 2A illustrates a first part of a blank for forming a carton according to a second embodiment of the invention;

30 Figure 2B illustrates a second part of a blank for forming a carton according to a second embodiment of the invention;

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Figure 2C is a perspective view from the front and side of a carton constructed from the blanks of Figs. 2A and 2B;

5 Figure 3A illustrates a first part of a blank for forming a carton according to a third embodiment of the invention;

Figure 3B illustrates a second part of a blank for forming a carton according to a third embodiment of the invention;

10 Figure 3C is a perspective view from the front and side of a carton constructed from the blanks of Figs. 3A and 3B;

15 Figure 3D is a top view of the carton of Fig. 3C., showing the removal of a bottle from the carton;

Figure 4A illustrates a first part of a blank for forming a carton according to a fourth embodiment of the invention;

20 Figure 4B illustrates a second part of a blank for forming a carton according to a fourth embodiment of the invention;

Figure 5A illustrates a first part of a blank for forming a carton according to a fifth embodiment of the invention;

25 Figure 5B illustrates a second part of a blank for forming a carton according to a fifth embodiment of the invention;

30 Figure 5C is a perspective view from the front and side of a carton constructed from the blanks of Figs. 5A and 5B;

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Figure 5D is a top view of the carton of Fig. 5C., showing the removal of a bottle from the carton;

Figure 6A illustrates a first part of a blank for forming a carton according to a sixth embodiment of the invention;

Figure 6B illustrates a second part of a blank for forming a carton according to a sixth embodiment of the invention;

Figure 6C is a top view of a carton constructed from the blanks of Figs. 6A and 6B;

Figure 7A illustrates a first part of a blank for forming a carton according to a seventh embodiment of the invention;

Figure 7B illustrates a second part of a blank for forming a carton according to a seventh embodiment of the invention;

Figure 7C is a perspective view from the front and side of a carton constructed from the blanks of Figs. 7A and 7B;

Figure 8A illustrates a first part of a blank for forming a carton according to an eighth embodiment of the invention;

Figure 8B illustrates a second part of a blank for forming a carton according to an eighth embodiment of the invention;

Figure 8C illustrates a first step in the folding process of the blank shown in Fig. 8B;

Figure 8D illustrates a first step in the folding process of the blank shown in Fig. 8A;

Figure 8E illustrates a step in the erection of a carton formed from the blanks of Figs. 8A and 8B;

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Figure 8F is a perspective view from the front and top of a carton constructed from the blanks of Figs. 8A and 8B;

5 Figure 9A illustrates a first part of a blank for forming a carton according to a ninth embodiment of the invention;

Figure 9B illustrates a second part of a blank for forming a carton according to a ninth embodiment of the invention;

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Figure 9C illustrates a step in the erection of a carton formed from the blanks of Figs. 9A and 9B;

15 Figure 9D is a perspective view from the front, side and top of a carton constructed from the blanks of Figs. 9A and 9B;

#### Detailed Description of the Preferred Embodiments

20 Figs. 1A and 1B, show a first and second part of a two-part blank respectively for forming a carton 30, made from paperboard or similar foldable sheet material. It is envisaged that a unitary blank could be used instead, without departing from the scope of the invention. In the first embodiment of the invention two blanks 10 and 20, of Figs. 1A & 1B are formed into a tubular crate and a cover respectively. The cover is inserted into the tubular crate to form the carton 30 of the first embodiment, which is shown in Fig. 1C.

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In the embodiments to be described it will be recognised that minor variations to the invention could be made for example a crash bottom of the type known in the art, could be employed without departing from the scope of the invention. The invention is designed to receive similar articles, such as bottles, but it is envisaged that the present invention could be  
30 used to contain other articles, without departing from the scope of the invention.

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Turning to Figure 1A, the blank 10 comprises a first side wall 12, a front panel 14, a second side wall 16 and a back panel 18, hingedly connected one to the next in series along fold lines 42, 44, 46 and 48 respectively. Handle apertures 54 are struck from the front and back panels 14, 18. Finger gripping tabs 58 protrude inward from the upper edges of the handle apertures 54. The finger gripping tabs enable the erected carton to be easily grasped and lifted by the handle apertures 54.

The blank further comprises bottom end flaps 72 and 74 hingedly connected to each of the first and second side walls 12, 16 along fold lines 62 and to each of the front and back panels 14, 18, along fold lines 64. The bottom end flaps 72, 74 provide a bottom end closure means when the blank is erected into a carton. It is envisaged that other bottom end closure means could be used without departing from the scope of the invention.

Top end flaps 76 are also provided and are hingedly connected to the first and second side walls 12, 16, opposite the end flaps 72. The top end flaps 76 can provide reinforcement to the first and second side walls 12, 16 when the blank is erected into the carton 30. The blank 10 also comprises a glue flap 88 which is hingedly connected to the back panel 18, along fold line 48.

Turning to the construction of the tubular crate from blank 10, a series of sequential folding and gluing operations are required, which preferably can be performed in a straight line machine, so that the crate and/or blank 10 are not required to be rotated or inverted to complete the construction. The folding process is not limited to that described below and can be altered according to particular manufacturing requirements.

The first stage is to apply glue to the outside edge of glue flap 88 and then fold it 180° about fold line 48 so that it lies in flat face contacting relation with the inside face of back panel 18. The front panel 14 is then folded about fold line 44 to lie flat on top of the inside face of second side panel 16. This causes the first side panel 12 to come into flat face contacting relation with the back panel 18 and the glued outer edge of glue flap 88, so that the first side panel 12 becomes stuck to the glue flap 88, thus connecting the first side panel 12 and back panel 18. The blank 10 can then be erected into a tubular structure and using a similar series



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of folding and gluing steps, the bottom end flaps 72, 74 can be secured to form a bottom end closure means.

In this embodiment of the invention the top end flaps 76 are glued and folded, inward of the crate, 180° about fold lines 66 to provide reinforcement to the top edges of the first and second side panels 12, 16. In other embodiments of the invention, the top end flaps 76 may be hingedly connected to panels of the second blank 20.

A second blank 20 is shown in Figure 1B, which can be formed into a cover for the tubular crate formed from the blank 10 of Figure 1A. The blank 20 comprises a main panel 22, which is, on either side, hingedly connected to inner handle panels 24 along fold lines 32. Handle apertures 54 are struck from the inner handle panels 24 and finger gripping tabs 58 protrude inward from the upper edges of the handle apertures 54. The inner handle panels 24 are hingedly connected, along folded lines 34, to outer handle panels 26, which have finger gripping tabs 58 integrally formed at their edges. The outer handle panels 26 are recessed and formed such that they compliment the shape of the handle apertures 54 struck from both the inner handle panels 24 and those struck from the front and back panels 14, 18. Cover end flaps 28 are hingedly connected to the main panel 22 along fold lines 38 and can provide structural rigidity as well as aesthetic appeal to the carton 30, when assembled.

The main panel 22 further comprises apertures 56 for receiving the similarly configured articles and each aperture is connected to at least one other aperture by a frangible connection or nick 37. In this first embodiment, the apertures 56 are arranged in two rows and each aperture 56 is connected to at least one other aperture 56 in the same row by a frangible connection or nick 37. In other embodiments of the invention, the arrangement of the apertures 56 or frangible connections or nicks 37 may differ from that described in the first embodiment of the invention. It is envisaged that many arrangements could be used without departing from the scope of the invention.

Once the tubular crate has been loaded with six bottles, in a 3 x 2 arrangement, the blank 20 is folded to form a cover. The inner handle panels 24 and cover flaps 28 are folded upward, out of the plane of main panel 22, 90° about fold lines 32 and 38. In this way, a

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complimentary insert is formed which can fit inside the tubular crate. Glue may then be applied to the outer faces of the inner handle panels 24, cover end flaps 28 and outer handle panels 26. The folded blank 20 is then inserted into the loaded carton so that the apertures 56 of the main panel 22 are brought into registry with the bottle necks. The inner handle panels 24 and cover flaps 28 may then be secured by use of glue to the inside faces of the front and back panels 14, 18 and to the inside faces of the first and second side walls 12, 16 as shown in Fig. 1C. The outer handle panels 26 are then folded about fold lines 34 and glued to the outside face of the front and back panels 14, 18 of the tubular crate. In this way, the structural integrity of the tubular carton is improved, particularly of the handle structure, which in this embodiment of the invention, is reinforced to form a 3 ply handle structure.

The carton formed from the blanks 10 and 20 is shown in Figure 1C. It can be seen that the bottles are secured within the carton, once the cover made from blank 20 has been secured inside the tubular crate. Access to the bottles is gained by separating the frangible connections or nicks 37, this may be achieved simply by pulling on a bottle contained within the carton 30. In this way each bottle can be accessed individually, whilst the structural integrity of the carton 30 is maintained. Bottles not removed are held in position by the apertures 56 in the cover. Therefore the carton provides an adaptable carrying container, the structural integrity of which is not destroyed when the bottles are accessed. This enables the carton to be reused for the convenient returning of the empty bottles. In this embodiment of the invention, when all bottles are removed, no material from the cover formed from blank 20 is actually removed from the carton 30.

It can be appreciated that various changes may be made within the scope of the present invention, for example, the size and shape of the panels and apertures may be adjusted to accommodate articles of differing size or shape. Figs. 2A – 9D illustrate further embodiments of the present invention, which will now be described by way of example only and to illustrate some of the changes that can be made, whilst keeping within the scope of the present invention. In subsequent figures similar reference numerals have been used to denote like features, the reference numerals in the second embodiment of the invention are increased by '200' to show that they represent features of the second embodiment. Since other

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embodiments have features common to the first embodiment herein before described, only differences in subsequent embodiments will be highlighted.

Shown in Figs. 2A, 2B and 2C is a second embodiment of the present invention wherein a tubular crate formed from a blank 210 is fitted with a cover formed from the blank 220 as in the first embodiment. In the second embodiment of the invention handle apertures 254 are struck from the first and second side walls 12, 16 and the top end flaps 76 are hingedly connected to the front and back panels 14, 18 instead of the arrangement of the first embodiment.

The second embodiment differs from the first in that the cover contains 12 apertures 256 for securing a uniform array of 12 bottles in a 3 x 4 arrangement within the carton. Access to the bottles is provided by severing the frangible connections or nicks 237, which again connect each aperture 256 in a row to at least one other aperture 256 of the same row. Additional frangible connections or nicks 237 are provided from some of the apertures 256 and the edges of the main panel 222. In this way access to the bottles neighbouring the carton 230 front and back panels 14, 18 is gained more readily. The structural integrity of the carton 230 remains after the bottles have been accessed and the cover formed from blank 220 remains substantially intact. The carton 230 can be used to recycle the bottles.

A third embodiment of the present invention is shown in Figs. 3A, 3B, 3C and 3D. The carton 330 formed from the blanks 310 and 320 is not rectangular as in the previous embodiments. The blank 310 contains additional corner panels 390 hingedly attached to each of the first and second side walls 312, 316, and to each of the front and back panels 314, 318, along fold lines 342a/342b, 344a/344b, 346a/346b and 348a/348b. The tubular carton erected from the blank 310 is octagonal for the purpose of providing additional protection to the bottles contained within the carton 330. The additional corner panels 390 protect the bottles which are positioned at the corners of the bottle arrangement. The cover for the tubular carton, erected from the blank 320, contains tabs 392 hingedly attached to the main panel 322 specifically adapted so that the shape of the complimentary cover fits securely into the tubular crate formed from the blank 310. The tabs 392 are folded similarly to the inner handle panels 324 and cover end flaps 328.

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A fourth embodiment of the present invention is shown in Figs. 4A and 4B. In this embodiment the front panel 414, back panel 418 and one of the end flaps 474 are provided with additional fold lines 480, 482, 484, which can be used to fold the assembled crate  
5 formed from blank 410 into a flat position. This enables the blank to be pre-glued to form the crate, yet provides a structure that can be folded into a flat condition, to facilitate in the storage and transportation prior to the crate being loaded with articles.

The construction of the crate from blank 410 is similar to that herein before described. The  
10 glue flap 488 is used to secure first side panel 412 to back panel 418 to form a tubular crate. A composite bottom wall is formed by securing the two end flaps 472 to each other. This may be achieved by use of adhesive or other means known in the art. The fold lines 480, 482, 484 are aligned such that the tubular crate formed from the blank 410 can be folded flat.

A fifth embodiment of the present invention is shown in Figs. 5A, 5B, 5C and 5D. The blank  
15 520 for forming the cover is similar to that of the previous embodiments, but is designed to facilitate a different arrangement of bottles or other similar articles. In this embodiment the articles loaded into the tubular crate, formed from the blank 510, are arranged in three rows; of four, three and four articles respectively. The apertures 556 of the center row of three are  
20 offset with respect to the apertures 556 of the adjacent rows. This configuration of articles or bottles provides recesses at opposed ends of the carton adjacent the front and back panels 514, 518. The recesses provide space inside the crate for a consumer's hands when the handle apertures 554, which are struck from the front and back panels 514, 518, are being used to lift the crate.

25 In order to access the bottles of the present embodiment the main panel 522 comprises frangible connections or nicks 537 which connect each of the apertures 556 of the central row to at least two apertures 556 in each of the other two rows, as shown in Fig. 5C. Additional frangible connections or nicks 537 are also provided between the apertures 556 which are  
30 closest to the first and second side walls 512, 516, and the first and second side walls 512, 516 of the carton 530. Similarly to the first embodiment, access to the bottles is gained by

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separating the nicks 537 around a bottle, as shown in Fig 5D. In this way each bottle can be accessed individually, whilst the structural integrity of the carton is maintained.

Yet a further embodiment is shown in Figs. 6A, 6B and 6C. The carton erected from the blanks 610 and 620 of the sixth embodiment is shown in Fig. 6C. In this embodiment, twelve bottles are arranged in two rows of six. Frangible connections or nicks 637 connect apertures 656 of one row to at least one aperture 656 of the adjacent row in such a way that some of the nicks 637, provided in the main panel 622, intersect. Separation of the nicks can be readily achieved in this embodiment by applying force at the point where the nicks 637 intersect. In this embodiment, the nicks 637 also extend between the apertures adjacent the front and back panels 614, 618 and the front and back panels 614, 618 themselves.

A seventh embodiment is shown in Figs. 7A, 7B and 7C. The blank 710 for forming the tubular crate is shown in Fig. 7A. The first and second side walls 712, 714 are also provided with handle apertures 754, so that the erected carton as shown in Fig. 7C has four reinforced handle structures, which improves the versatility of the carton 730.

In the seventh embodiment of the present invention the blank 720 for forming the cover is provided with inner handle panels 724 and outer handle panels 726 on each of the sides of the main panel 722 rather than only on two sides as in the first embodiment. The cover is secured to the crate, formed from the blank 710, in a similar way as in the first embodiment; each of the inner handle panels 724 are folded upward, out of the plane of main panel 722 to form the complimentary insert. This fits inside the loaded tubular crate. Glue or other securing means known in the art, may then be applied to the outer faces of the inner handle panels 724 and outer handle panels 726. The folded blank 720 may then be inserted into the loaded carton so that the apertures 754 of the main panel 722 are brought into registry with the necks of the bottles. The inner handle panels 724 are then secured to the inside faces of each of the front and back panels 714, 718 and the first and second side walls 712, 716 as shown in Figure 7C. The outer handle panels 726 can then be folded and glued to the outside faces of each of the front and back panels 714, 718 and the first and second side walls 712, 716 of the tubular crate.

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An eighth embodiment of the invention is shown in Figs. 8A - 8F. In this embodiment of the invention, the carton 830 is designed to receive twelve bottles, in four rows of three, where the end most rows are hidden from view beneath raised cover flaps 828b. The main panel 822 is provided with six apertures 856 in two rows of three to display the remaining six bottles. Frangible connections or nicks 837 connect each of the apertures 856 to at least one other aperture 856.

As in other embodiments of the invention handle panels 854 are struck from the first and second side walls 12, 16 and top end flaps 876 are provided, hingedly connected to the front and back panels. In this embodiment however the top end flaps 876 are not secured in flat face contact with the front and back panels 14, 18 and are secured to the cover of blank 820 when the blanks 810, 820 are erected into a carton 830. The blank 820 is provided with cover end flaps 828a and 828b on either side of the main panel 822. To erect the carton the inner and outer handle panels 824, 826 and cover end flaps 828a and 828b are folded upward out of the plane of the main panel 822 as shown in Fig. 8C. The tubular crate of Fig. 8D is erected via a similar operation of folding and gluing steps, although the top end flaps 876 are not secured to the front and back panels 14, 18. The cover of Fig. 8C is brought into registry with the loaded carton of 8D so that the inner and outer handle panels 824, 826 are secured to the carton as described in other embodiments. The cover end flaps 828a and 828b are folded as shown in Fig. 8E with the cover end flaps 828b being secured by adhesive or other known means, to the top end flaps 876. In this way, two rectangular covers are provided which shield the endmost bottles contained within the carton 830 from view as shown in Fig. 8F. The cover end flaps 828b also provide an area which enables the cartons 830 of the eighth embodiment to be stacked more readily on top of each other.

A ninth embodiment is shown in Figs. 9A, 9B and 9C. In the ninth embodiment, reinforcement of the handle structure is provided by inner handle panels 996 which are attached to the blank 910, for forming the tubular crate, rather than attached to the blank 920, for forming the cover, as in the first embodiment. The inner handle panels 996 are, in this embodiment, foldably attached to the first and second side wall panels 912, 916 and are foldably connected to adjacent top end flaps 976. The tubular crate is erected by a similar series of folding and gluing steps as previously described. However, in this embodiment the

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top end flaps 976 can be used to secure the cover formed from the blank 920, within the tubular carton, without the need for glue.

The blank 920 comprises a main panel 922 and cover flaps 928a and 928b foldably attached to the main panel along fold lines 938a and 938b. To ensure that the cover flaps 928b do not obscure the handle apertures 954 when the cover formed from the blank 920 is inserted into the tubular crate, the cover flaps 928b are folded downward out of the plane of main panel 922 and are obscured from view when the carton 930 is fully erected. The cover flaps 928a can be folded either upward or downward out of the plane of main panel 922 and may or may not be secured to the tubular crate by use of glue. If the cover flaps 928a are folded upward out of the plane of the main panel 922 then the cover formed from the blank 920 may be locked within the tubular carton by folding the top end flaps 976 and adjacent inner handle panels 996 about fold lines 966 and 968. This action may lock the cover within the tubular crate such that the cover flaps 928a are in flat face contacting relationship between top end flaps 976 and an adjacent upper portion of the front and back panels 914, 918.

It is envisaged that the features of the various embodiments herein described could be combined without departing from the scope of the present invention. For example, the cover formed from blank 520 of the fifth embodiment could be sized to fit the tubular crate formed from blank 410 of the fourth embodiment.

In other embodiments of the invention the apertures formed within the top panel may not be circular and may also be provided with additional tabs protruding into the aperture, to aid retention of the bottle necks or other articles contained within the carton.

It will be recognised that as used herein, directional references such as "top", "bottom", "front", "back", "end", "side", "inner", "outer", "upper" and "lower" do not limit the respective panels to such orientation, but merely serve to distinguish these panels from one another. Any reference to hinged connection should not be construed as necessarily referring to a single fold line only; indeed it is envisaged that hinged connection can be formed from one or more of the following, a score line, a frangible line or a fold line without departing from the scope of the invention.